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Original Article

Role of comprehensive nursing care in improving the prognosis and mood of patients with secondary cerebral infarction after craniocerebral injury

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Abstract: Objective: To explore the application value of comprehensive nursing in improving prognosis and relieving bad moods of patients with secondary cerebral infarction after craniocerebral injury. Methods: Patients with cerebral infarction secondary to craniocerebral injury in our hospital from January 2017 to October 2019 were selected as the study subjects. According to the random number table method, they were randomly divided into the control group and the observation group, with 40 patients in each group. The control group was given routine nursing care and the observation group was given comprehensive nursing care. The prognosis, the changes of mood before and after nursing, nursing satisfaction, quality of life after nursing, and complications were compared between the two groups. Results: After the implementation of nursing, the good prognosis rate of the observation group was 90.00% (36/40), significantly higher than that of the control group 60.00% (24/40) (P<0.05); the HAMA and HDRS scores of the observation group were significantly better than that of the control group, and the nursing satisfaction rate was higher than that of the control group (P<0.05). The total score of quality of life in the observation group was significantly higher than that in the control group, and the incidence of complications was significantly lower than that in the control group (P<0.05). Conclusion: Comprehensive nursing care for patients with secondary cerebral infarction after craniocerebral injury can effectively improve prognosis and relieve bad moods, reduce the incidence of complications and improve nursing satisfaction, so as to improve the quality of life of patients.

Keywords: Comprehensive nursing, craniocerebral injury, secondary cerebral infarction, prognosis, bad mood

Introduction

Craniocerebral injury, a common type of traumatic brain injury, is complicated by secondary cerebral infarction in severe cases, with complex clinical symptoms, high disability and mortality. Most patients have unclear consciousness and critical illness upon admission. Due to the fact that the signs and symptoms of cerebral infarction are not always obvious, it is easy to miss the clinical diagnosis of the primary damage of craniocerebral injury. Consequently, the mortality rate of patients with secondary cerebral infarction following craniocerebral injury is extremely high [1], especially massive cerebral infarction. The main factors such as difficulty in treatment and nursing care, complex conditions, multiple complications, and mood swings can also lead to a poor prognosis and negative emotions [2]. To our best knowledge, symptomatic treatment as well as nursing intervention for patients with craniocerebral injury helps to improve the success rate of treatment [3]. Comprehensive nursing takes the nursing procedure as the core and systematizes the nursing procedures. Nursing procedures as a framework are refined into the aspects of nurses' duties and evaluations, standardized nursing plans, patient education plans, discharge plans, filling in various nursing forms, and control of nursing quality. They are coordinated in harmony to ensure the quality of nursing services. This care combines the advantages of responsible care and group care. Yet little research has reported whether nursing care can improve patients' prognosis and bad

moods. This study aimed to test the application value of comprehensive nursing intervention in improving the prognosis of patients with cerebral infarction secondary to craniocerebral injury and relieving their bad moods.

Materials and methods

General information

Patients with cerebral infarction secondary to craniocerebral injury admitted to our hospital from January 2017 to October 2019 were selected as the research subjects.

Inclusion criteria: (1) Patients who met the diagnostic criteria for craniocerebral injury [4] and were classified into the following types. Mild: coma duration after injury was 0-30 min, mild headache, dizziness, including simple concussions, with or without skull fracture. Moderate: coma after injury for less than 12 h, slight changes in body temperature, breathing, blood pressure, and pulse, including mild brain contusions and laceration, with or without skull fracture and subarachnoid hemorrhage, without brain compression. Severe: coma after injury for over 12 h, consciousness disorders gradually worsened or reappearing coma, as well as body temperature regulation issues, with obvious changes to breathing, blood pressure and pulse, including extensive skull fracture, extensive brain contusion and brain stem injury or intracranial hematoma. (2) After CT or MRI examination, all patients had different degrees of brain brain stem infarction; (3) All patients were admitted within 4 hours after injury and were in a coma upon admission; (4) Glasgow coma score (GCS) upon admission was <12 points [5].

Exclusion criteria: (1) Patients with a history of liver disease and blood system disease; (2) Patients with a history of cerebral infarction and deep vein thrombosis; (3) Patients with a history of taking anticoagulant drugs within one month prior to treatment. In the end, 80 patients aged 12-72 years old were enrolled and randomly divided into the control group and the observation group according to a random number table method (according to the order of admission). All patients and their families voluntarily participated in this study and signed an informed consent form. This study was approved by the ethics committee of our hospital.

Methods

After admission, the patients were given basic treatment for dehydration to reduce intracranial pressure, establishment of venous access, ECG monitoring, anti-infection care, and oxygen inhalation assistance to keep the airway unobstructed and help further restore brain cells. The control group received routine nursing care, and the observation group received comprehensive nursing care. The details were as follows. (1) Respiratory nursing care: Patients were kept in a clean, pollution-free, fresh air ward, with disinfected indoor air with ultraviolet rays on a regular basis [6]. Humidification of the airway with a nebulizer 4 times a day. For patients with tracheal intubation or tracheotomy, the tracheostomy cannula was fixed, disinfected once or twice a day, and the dressing at the tracheotomy wound was changed. In order to ensure the proper pressure in the airbag, it is necessary to periodically replace the disposable air sleeve, and deflate and inflate the bag to monitor the pressure [7]. (2) High fever nursing care: Most patients with craniocerebral injury have a central high fever, which is difficult to reduce. Such patients were placed in air-conditioned wards, or had ice caps or ice pillows to cool them down, with hibernation drugs and appropriate doses of muscle relaxants by intravenous pumping. We adjusted the rate of administration according to the conditions [8]. (3) Functional exercise: Exercise such as body placement, turning over, sitting, standing, balance training, walking training and daily living ability training were conducted 1-2 times per day, 20-40 minutes per time. (4) Language function exercises: Pronunciation, speaking, listening, reading and writing exercises were provided for the patients. Each activity length was determined depending on the patient's mental state. (5) Psychological nursing care: The recovery process of cerebral infarction secondary to craniocerebral injury is long, and patients are prone to negative psychology such as pessimism, anxiety, depression, aloofness, and impatience. Nursing staff can help take care of patients according to their individual psychology, so as to alleviate the patients' moods, enhance their confidence and encour-

Table 1. Comparison of general data [n (%), ($\bar{x}$ ± sd)]

Items	Control group (n=40)	Observation group (n=40)	$t/\chi^2/Z$	*P*
Gender			0.809	0.058
Male	27 (67.50)	28 (70.00)		
Female	13 (32.50)	12 (30.00)		
Average age (year)	36.08±4.35	37.23±4.59	1.154	0.251
Type of injuries			-0.0372	0.710
Traffic accident	19 (47.50)	20 (50.00)		
Falls	6 (15.00)	7 (17.50)		
Collision	10 (25.00)	9 (22.50)		
Others	5 (12.50)	4 (10.00)		
Severity of disease			-0.160	0.873
Mild	16 (40.00)	17 (42.50)		
Moderate	15 (37.50)	14 (35.00)		
Severe	9 (22.50)	9 (22.50)		
Occurrence time of cerebral infarction			-0.513	0.608
Immediately after injuries	7 (17.50)	6 (15.00)		
Within 1 h-1 d	13 (32.50)	12 (30.00)		
Within 1-3 d	17 (42.50)	18 (45.00)		
Beyond 4 d	3 (7.50)	4 (10.00)		
GCS score			-0.130	0.897
3-5 points	7 (17.50)	8 (20.00)		
6-8 points	18 (45.00)	17 (42.50)		
9-11 points	15 (37.50)	15 (37.50)		

age them to overcome the disease, and enable them to actively cooperate with the treatment.

Observation indicators

Primary observation indicators: (1) The GOS was used to evaluate the prognosis of patients. The total score is 1-5 points, 1 point represents death, 2 represents vegetative survival, 3 represents severe disability, 4 represents light disability, 5 represents good recovery; More than 3 points indicates a good prognosis, while ≤ 3 indicates a poor prognosis. (2) The changes of negative emotions in the two groups before and after nursing. Patients' bad moods were evaluated by Hamilton Anxiety Scale (HAMA) and Hamilton Depression Rating Scale (HDRS) scores [9]. There is a total of 24 items, with each item having 0-4 points. Over 18 points marks anxiety or depression, and the higher the value, the more serious the bad mood. (3) The incidence of complications (urinary tract infection, lung infection, stress ulcer, electrolyte disturbance) in the two groups was compared.

Secondary observation indicators: (1) Nursing satisfaction score was graded with 80-100 points being very satisfied, 60-79 points being generally satisfied, <60 points being dissatisfied. Satisfaction rating = (very satisfied + generally satisfied)/total number of cases * 100%. (2) Comparison of the quality of life of the two groups of patients after nursing care was conducted, including the psychological function, motor function, cognitive function, social function, and quality of life. The total score is 100 points. The higher the score, the better the condition.

Statistical methods

SPSS 19.0 statistical software was used to analyze the data. Quantitative data were expressed by ($\bar{x}$ ± sd) and analyzed by t-test; qualitative data were expressed by [n (%)] and chi-square test was used; rank-sum test was used for grade data, and P<0.05 indicated that the difference was statistically significant.

Results

General information comparison

There was no statistically significant difference in baseline information between the two groups of patients (P>0.05). See **Table 1**.

Table 2. Comparison of prognosis [n (%)]

Groups	n	favorable prognosis		Poor prognosis			Improved rate
		No disability or normal	Light disability	Death	vegetative state	severe disability	
Control group	40	13 (35.00)	11 (27.50)	4 (10.00)	5 (12.50)	7 (17.50)	24 (60.00)
Observation group	40	20 (50.00)	16 (40.00)	1 (2.50)	1 (2.50)	2 (5.00)	36 (90.00)
Z				-2.495			
P				0.013			

Table 3. Changes of bad mood before and after nursing ($\bar{x}$ ± sd, points)

Groups	HAMA		HDRS	
	Before nursing care	After nursing care	Before nursing care	After nursing care
Control group	27.64±3.18	19.35±2.74	28.07±3.12	19.63±2.94
Observation group	27.92±3.21	13.65±2.43	28.17±3.22	12.54±2.39
t	0.391	9.844	0.141	11.830
P	0.696	<0.001	0.888	<0.001

Primary outcomes

Prognosis of the two groups of patients: The good prognosis rate of the observation group was higher, by contrast, the control group was lower [90.00% (36/40) vs 60.00% (24/40)] (P<0.05). See **Table 2**.

Changes of bad moods before and after nursing: The comparison of HAMA and HDRS scores before care between the two groups was of no statistical difference (P>0.05); the HAMA and HDRS scores of the observation group after nursing were significantly better than those of the control group (P<0.05). See **Table 3**.

Comparison of complications between the two groups: As compared with the control group, the complication rate of the observation group after comprehensive nursing care was lower [20.00% (8/40) vs 45.00% (18/40)] (P<0.05). See **Table 4**.

Secondary outcomes

Nursing satisfaction: After nursing care, the observation group's nursing satisfaction was higher in comparison with the control group [95.00% (38/40) vs 77.50% (31/40)] (P<0.05). See **Table 5**.

Quality of life

After nursing care, the total quality of life score of the observation group was significantly higher as compared with the control group [(74.62±7.14) vs (63.72±6.35)] (P<0.05). See **Table 6**.

Discussion

Cerebral infarction secondary to craniocerebral injury is a common neurosurgical disease. Due to the serious and complicated conditions, and difficult treatment and nursing care, it can seriously affect the patient's life quality and mood. If timely treatment is not provided, it will cause serious consequences and even death [10]. Clinically, craniocerebral injuries are mostly caused by external forces, and most patients are in coma and unconscious after injury, with a variety of complicated symptoms, and signs of secondary cerebral infarction are masked [11]. The main factors that cause secondary cerebral infarction are as follows. (1) Cerebrovascular injury: craniocerebral trauma and secondary injury can cause the occlusion and rupture of blood vessels in the brain, which in turn affects the blood supply and oxygen supply of the brain, and triggers cerebral infarction. (2) Cerebral vasospasm: Severe craniocerebral injuries cause brain and blood cells to decompose, and to produce polypeptides, kinins, serotonin and other harmful mediators. Consequently, it stimulates cerebral vasospasm, causing brain ischemia and hypoxia and inducing cerebral infarction [12]. (3) Hemodynamic changes: Pathological symptoms such as increased intracranial pressure, decreased cere-

Table 4. Comparison of complications [n (%)]

Groups	n	urinary tract infection	lung infection	stress ulcer	electrolyte disturbance	Totaling
Control group	40	5 (12.50)	4 (10.00)	6 (15.00)	3 (7.50)	18 (45.00)
Observation group	40	3 (7.50)	2 (5.00)	2 (5.00)	1 (2.50)	8 (20.00)
χ^2						5.698
P						0.017

Table 5. Comparison of satisfaction rate [n (%)]

Groups	n	Satisfied	Generally satisfied	Dissatisfied	Satisfaction rate
Control group	40	21 (52.50)	10 (25.00)	9 (22.50)	31 (77.50)
Observation group	40	33 (82.50)	5 (12.50)	2 (5.00)	38 (95.00)
χ^2					5.165
P					0.023

bral perfusion pressure, slow blood flow, intracranial hematoma, brain contusions and edema of surrounding tissues often occur after craniocerebral injuries. It can increase blood viscosity, activate coagulation and promote the formation of thrombus in the blood vessels, which provides pathological changes for the occurrence of cerebral infarction [13]. (4) Iatrogenic factors: Clinically, for patients with craniocerebral injury, hemostatic agents and dehydrating drugs are usually used to treat and limit the amount of fluid replacement, which leads to a state of high coagulation and low blood flow, and induces cerebral infarction [14]. Therefore, on the basis of symptomatic treatment, comprehensive nursing measures are of great significance to improve the prognosis of patients.

The present study showed that the good prognosis rate of the observation group was higher than the control group's, indicating that comprehensive nursing care can significantly improve the life quality of patients with cerebral infarction secondary to craniocerebral injury. Since the treatment duration is long and most patients need to be in bed, the incidence of urinary tract infections, lung infections, stress ulcers, electrolyte disturbances and other related complications is high [15]. The analysis of the complications in this study found that not only the complication rate of the observation group was lower than that of the control group, and also that the HAMA and HDRS scores of the observation group after nursing were significantly better. This shows that comprehensive nursing care can reduce the incidence of complications in patients with cerebral infarction secondary to craniocerebral injury. This is presumably due to the fact that comprehensive nursing care can provide targeted measures based on the individual psychological and physical conditions, so nursing staff can strengthen nutritional support accordingly and effectively alleviate the psychological burden and bad mood of patients. These are conducive to reduce the occurrence of complications, improve the safety of the treatment process, and increase the cure rate [16]. However, for unexpected changes and traumas, coupled with the inability to move on their own, and the long treatment time, patients do not handle them well and are prone to anxiety, depression, and despair. Bad emotions stimulate patients conditions and aggravate the clinical symptoms, which forms a vicious circle, and compromises the treatment effects and affects the patient's quality of life [17, 18]. In this regard, nursing staff carried out comprehensive nursing care based on the patient's individual conditions, offered care and support to the patient, eliminated the patient's anxiety, depression and other unhealthy emotions, and encouraged the patient to cooperate with the treatment with an optimistic attitude to build confidence in overcoming the disease. As a result, the observation group obtained a higher total quality of life and nursing satisfaction rate. After craniocerebral injury, there will be varying degrees of limb, language or other types of dysfunction. Patients with secondary cerebral infarction after craniocerebral injury can start rehabilitation when their vital signs resume stable, such as reconstructing various physiological functions and promoting wound recovery. In comprehensive nursing care, passive limb movements are given to comatosed patients to maintain their limb function; conscious patients are provided

Table 6. Comparison of quality of life ($\bar{x} \pm sd$, points)

Groups	n	psychological function	motor function	cognitive function	social function	quality of life
Control group	40	61.57±5.16	60.28±5.75	53.42±5.31	62.54±7.63	63.72±6.35
Observation group	40	72.45±6.28	78.53±5.86	68.47±7.26	70.46±7.82	74.62±7.14
t		8.466	14.060	10.580	4.585	7.215
P		<0.001	<0.001	<0.001	0.000	<0.001

with exercise of the healthy side limbs, and massage to promote the patient's overall functional recovery, as well as language function training to form simple words, numbers, and phrases [19].

The results indicate that comprehensive nursing intervention is effective for patients with secondary cerebral infarction after craniocerebral injury, which is beneficial to improve quality of life and prognosis of patients. In addition, comprehensive nursing care can meet the different needs of patients in terms of physiology, psychology, and society to a greater extent. Moreover, patients and their families are quite satisfied with comprehensive nursing care. Finally, subjective initiative is improved, and the quality of life is also enhanced [20, 21]. There were 5 deaths in the two groups of patients. The reason may have been that their cerebral infarction was serious, coupled with coma state and poor physical fitness, etc., thus routine care could not be carried out efficiently, the patients could not cooperate with care, and effective nursing care was not well performed. The limitation of this study is that the number of samples included is small, the long-term follow-up was not performed, and the future quality of life scores and long-term survival rate of patients was not obtained. In the future, the sample size will be expanded for long-term follow-up trials.

To sum up, comprehensive nursing was performed in terms of care for the respiratory tract, fever, functional exercise, language function exercise and psychological nursing, etc., all of which can effectively improve the patient's prognosis and negative emotions for patients with secondary cerebral infarction after craniocerebral injury, which is beneficial to reduce the incidence of complications and promote nursing satisfaction, thereby improving the quality of life of patients.

Disclosure of conflict of interest

None.

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